C·R·E·S®
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

REPORT

FALL 1999

Bonobo Familiarity Leads to…Reproduction

Bud Heller Fellowship Project Continues at the Wild Animal Park

Of all the great ape species, the least is known about bonobos. In the wild, they have suffered from habitat destruction and the bushmeat trade, so that possibly fewer than 10,000 remain in central Africa. Add to this an extremely small captive-breeding population of about 121 animals worldwide, with a slow reproduction rate (intervals of 4.5 years), and it is clear that a study was needed to understand reproduction among captive bonobos. Because the largest United States bonobo population is in San Diego—16 individuals between the San Diego Zoo and the Wild Animal Park—we believe that the future for this species will be influenced by what we learn of their reproduction today.

The study's focus is on questions of social stress and how this affects sexual relationships within the troop; how a female's estrous cycle development and adolescent sterility are hormonally regulated; and whether breeding is restricted to coincide with the female's ovulation. A study under captive conditions is needed in order to collect urine samples, evaluate swelling levels, and keep track of each individual's behavior. Through analysis of fecal and urinary samples in the endocrinology lab at CRES, we characterized ovarian hormone metabolites, which led to a better understanding of the relationship between hormones, perineal swellings, and social behavior in bonobos. This substantial baseline information on bonobos will be essential for monitoring populations in their native habitat.

There are reports in the scientific literature on the social and reproductive behavior of common chimpanzees and bonobos, but data on ovarian activity is less available; in bonobos, this has been based almost exclusively on the conspicuous perineal swellings of the females. One hypothesis was that association patterns would change across phases of the ovarian cycle. However, statistical analysis revealed no significant pattern in associations across the ovarian phases, and it seems

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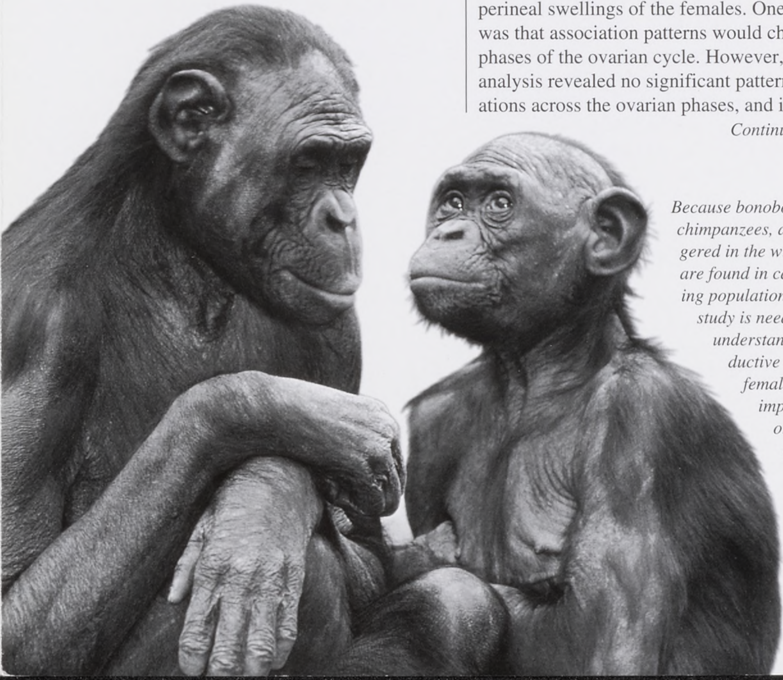

Because bonobos, or pygmy chimpanzees, are endangered in the wild and few are found in captive-breeding populations, this CRES study is needed to better understand the reproductive cycle of the female and its implications on other members of the troop.

CRES® is operated by the Zoological Society of San Diego.

Cuban Iguana Studies
CRES ecology division looks at iguanas as seed dispersers. See page 3.

Matching Gifts Program
Learn how to double your contribution to the Zoological Society! See page 4.

Don't Miss Cool Cats ✶ Hot Nights at the Zoo!
Come for Celebration for the Critters. See back cover.

Bonobo Familiarity Leads to...Reproduction

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likely that social factors play a large role in association patterns. The bonobo is known to be a very social species, especially the female, who associates regularly with both males and females (among common chimpanzees, the female-female bonding is less prevalent). Therefore, if the female is already associating frequently with both males and females, changes in association levels may be small and difficult to detect with a small group size.

Also, timing of ovulation in bonobos may be difficult for males to assess, given the prolonged periods of sexual swelling and female receptivity, which together may conceal the exact time of ovulation to an observer. If the male does not know when the female is actually most fertile, he will not change his association patterns with her as much as if he knew. Further, the female's continuous receptivity indicates she may be unaware of her time of ovulation as well, and so her association patterns with the group members would not be expected to be greatly influenced by the menstrual cycle.

Androgens belong to a class of hormones that are primarily found in males, such as testosterone, and they are known to influence female proceptive sexual behavior in a number of species: gorillas and chimpanzees, as well as humans. When compared with chimpanzees, androgen levels in bonobo females were elevated during a greater portion of the follicular phase, which is when the ovaries and uterus are being prepared for ovulation. Comparisons of behaviors and elevated hormone levels show that socio-sexual behavior between females is significantly correlated with testosterone levels. This seems to have evolved to allay social tensions resulting from larger group size, while allowing females to form bonds with each other to maintain priority at feeding sites. The strong correlation between testosterone and female-female nonreproductive sexual behavior (GG-rubbing) suggests that this physiological change co-evolved with associated behaviors, specifically those that encouraged female-female bonding.

These preliminary results from the study are indicators of the bonobo's distinct position among hominoids. Bonobos appear to be behaviorally, and to some degree physiologically, different from the common chimpanzee while demonstrating some similarities to humans. This may lead to new insights into the evolution of primate behavior.

—Mike Jurke, Ph.D.
Endocrinology Division/CRES

Most of the Zoological Society's valuable behavior studies are done by volunteer observers like Christine Brewer. In this study, the behavior of each adult female is recorded for half an hour every morning. These behavioral data are later compiled and analyzed for trends.

This year's Bud Heller Fellow is Jean-Pierre Montagne, who is working with the CRES endocrinology division. Under the direction of Dr. Mike Jurke, he has spent this year analyzing hormonal changes in female bonobos and evaluating their behaviors with respect to varying hormone levels.

The Bud Heller Conservation Fellowship

The Heller Foundation of San Diego has established in perpetuity the Bud Heller Conservation Fellowship for CRES research at the San Diego Wild Animal Park. The $30,000 annual fellowship was named in memory of the late Bud Heller, who quietly supported the Zoological Society for many years to help make the Wild Animal Park the superb facility it is today. Bud's generous personal and foundation gifts, which consisted of much-needed yet unglamorous items from trucks to wire fences, totaled nearly half a million dollars. Bud always declined the recognition he so deserved, and the Society is delighted that the Heller Foundation of San Diego has chosen to make this tribute to a modest man who made an important difference to conservation.

This year's Bud Heller Fellow is Jean-Pierre Montagne of the endocrinology division, under the direction of Mike Jurke, Ph.D., and his study is designed to further knowledge of the behavior and reproductive cycles of bonobos, or pygmy chimpanzees, at the Wild Animal Park. CRES thanks the Heller Foundation for its valuable support of a critically endangered species.

Ecology

As a result of habitat destruction and clearing of land, extraction of forest products, and invasive species, the dry tropical forests of the West Indies are one of the most endangered ecosystems on Earth. These fragile forests support a rich mixture of rare cacti, agave, epiphytes, and spiny trees and shrubs. Because West Indian iguanas consume a variety of fruits and flowers, they probably function as important seed dispersers for many of these native plants. The Turks and Caicos Islands iguana is known to feed on 58 different plant species, the Cuban iguana on at least 25 species, the iguanas of the Cayman Islands on over 45 species, and the Mona Island iguana on 71 species. Because iguanas do not chew their food and digestion of vegetation is incomplete, seeds passing through their digestive tracts emerge intact and are generally still capable of germination.

As part of a larger program on the ecology and conservation of Cuban iguanas at the U.S. Navy base at Guantanamo Bay, Cuba, researchers in the CRES ecology division are studying the potentially critical role that iguanas play in dispersing the seeds of native plants. We are conducting germination experiments in collaboration with the Zoo's horticulture department to determine which plant species Cuban iguanas are consuming in the wild. Although even after six months we continue to be surprised by new sprouts, to date we have successfully grown a large number of individual plants of different species from iguana fecal samples and plan to work closely with botany staff at the San Diego Natural History Museum in order to identify them.

J. Phillips

J. Lemm

CRES researchers now know that Cuban iguanas feed on at least 25 plant species, and they probably play a critical role in seed dispersal in the wild. At the San Diego Zoo, staff horticulturists Saula Ligani (left) and Sam Karcher are part of a team collaborating with CRES ecology division staff on germination experiments to pinpoint which plant species these iguanas consume in the wild. A large number of plants already have been grown from iguana fecal samples, and staff botanists from the San Diego Natural History Museum will help in identification of species.

Grants

The Center for Reproduction of Endangered Species is grateful to the following for their support of imperiled wildlife:

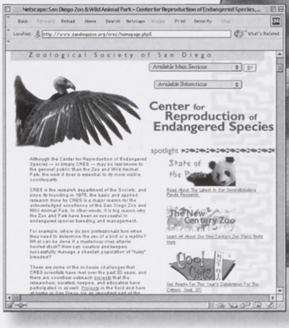
An **Anonymous** donor has given a $25,000 grant to the CRES behavior division under the direction of Dr. Donald Lindburg. The grant will fund renovation of a primate corral at the Wild Animal Park and allow for the purchase of several needed items. The **L.J. Skaggs and Mary C. Skaggs Foundation** has given a $7,500 grant in support of Dr. Barbara Durrant's work in optimizing cryopreservation techniques for carnivore species, including the giant pandas. The **John and Beverly Stauffer Foundation** has given a $10,000 grant to the CRES genetics division toward Dr. Oliver Ryder's work in conservation of the black rhinoceros and other species.

A Wild Web Site Waits for You!

If you have a computer at home, get connected with the Zoological Society of San Diego's Web site at http://www.sandiegozoo.org, where you'll get fascinating updates on the latest animal births, education programs, CRES projects, and Society events. In the CRES section, click on the world map and learn about the many field projects worldwide that are sponsored by the Society, from giant pandas in China to Chacoan peccaries in Paraguay to rock iguanas in Jamaica.

Since it was founded in 1975, CRES and the Society have become involved in many research projects around the world. At home and abroad, CRES scientists have worked to solve the reproduction puzzles of dozens of endangered species, from the highly publicized giant pandas to "fussy" breeders like cheetahs. The important DNA studies done at CRES in the 1980s helped to save the California condor from extinction when new methods were devised to sex young birds. These methods were later applied to other bird species and then to reptiles, many of which are difficult to sex as juveniles.

So hop on the Web and learn something new and exciting about your Zoo, the Zoological Society, and the important work going on at CRES every day. You will see why there are compelling reasons to continue these studies and why the support of Society members and that of the community contribute so much to these conservation efforts on behalf of preserving the Earth's biodiversity.



http://www.sandiegozoo.org/cres/homepage.php3

Zoological Society of San Diego

Center for Reproduction of Endangered Species

Although the Center for Reproduction of Endangered Species — or simply CRES — may be less known to the general public than the Zoo and Wild Animal Park, the work it does is essential to its more visible counterparts.

CRES is the research department of the Society, and since its founding in 1975, the basic and applied research done by CRES is a major reason for the acknowledged excellence of the San Diego Zoo and Wild Animal Park. In other words, it is big reason why the Zoo and Park have been so successful in endangered species breeding and management.

For example, where do zoo professionals turn when they need to determine the sex of a bird or a reptile? What can be done if a mysterious virus attacks hoofed stock? How can curators and keepers successfully manage a cheetah population of "fussy" breeders?

These are some of the in-house challenges that CRES scientists have met over the past 20 years, and there are countless outreach projects that the researchers, curators, keepers, and educators have participated in as well. Projects in the field and here at home in San Diego are an important part of the

Read About The Latest In Our Groundbreaking Panda Research.

Learn All About Our New Century Zoo Plans Right Here

Get Ready For This Year's Celebration For The Critters, Sept. 25!

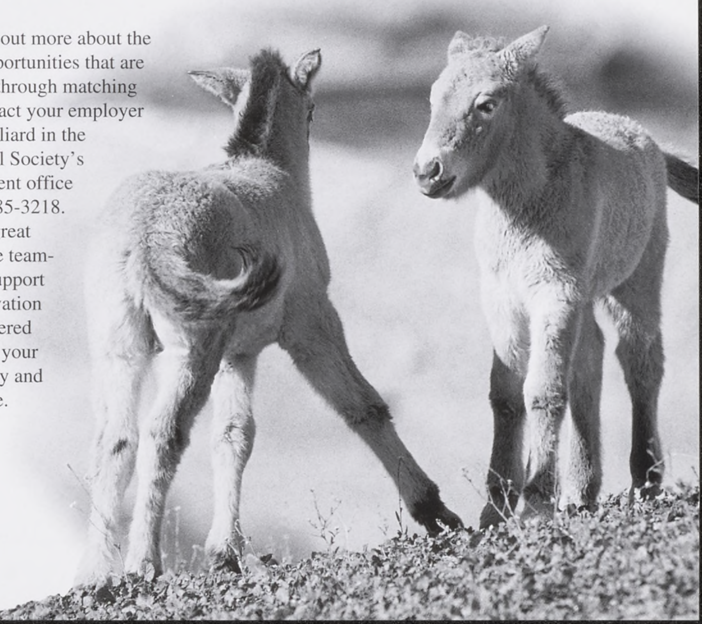
There's Added Value to Matching Gifts!

Did you know that your support of the Zoological Society of San Diego can grow through participation in our Matching Gifts Program? Matching gifts can make optimum use of the resources available to you through your employer that, in turn, can increase financial contributions to the Center for Reproduction of Endangered Species (CRES).

The leadership provided by those individuals who match their own contributions through this program is important to the continued success of our conservation programs at CRES. Employees and often retirees are eligible for matching gifts, and many companies in the San Diego community participate in this type of charitable giving.

MATCHING GIFTS

To find out more about the giving opportunities that are available through matching gifts, contact your employer or Juli Hilliard in the Zoological Society's development office at (619) 685-3218. This is a great way to use teamwork in support of conservation of endangered species in your community and worldwide.



Cans for Critters 2000!

Cans for Critters is celebrating its 20th anniversary in 2000! Join this fun and educational recycling program that enables all youngsters to actively contribute to the betterment of our environment and the future of endangered animals. Participants receive prizes, critter visits from the Zoological Society's education department, and can participate in the Cans for Critters Jamboree awards celebration hosted at the San Diego Zoo. Proceeds from the program directly benefit CRES in its research projects aimed at improving the chances of survival for many threatened animals.

For more information on what your organization, school, troop, or company CAN do to help CRES and the environment, please call Tamara Langmead at (619) 744-3362. The program can be tailored to your individual needs. Dates for the next drive are February 1 to April 30, with the Jamboree on May 12, 2000.

Join us on Saturday, January 22, for our CANDEMONIUM 2000 drive opener! Just drop off a grocery bag full of empty aluminum cans at the Cans for Critters recycling domes in front of the San Diego Zoo from 9 A.M. to 3 P.M. and receive free entry into the Zoo (valid for January 22 only).

T. Langmead

Birds CAN recycle at the 1999 Cans for Critters Jamboree! Zazu, a wrinkled hornbill, demonstrates his CAN DO abilities with animal trainer Suzanne Merner from the Zoo's Hunte Amphitheater.

Investing for the Future of Our Endangered Wildlife

In the early 1980s, the Zoological Society of San Diego established a fund to provide a continual source of financial support to CRES. The CRES Fund began with an initial restricted gift of $190,000 and, through investment and the generosity of many individuals, corporations and foundations, has grown to nearly 30 million dollars this year!

A percentage of the income derived from investment of the Fund principal is distributed annually to provide significant support to the vital and groundbreaking research programs undertaken at CRES. Each contribution to the CRES Fund helps secure the future of CRES programs and the irreplaceable wildlife our CRES researchers are striving daily to save all over the world. Gifts of any size may be contributed to the CRES Fund, and these may be made through outright gifts of cash or appreciated securities, or through designations in wills, trusts, or other estate planning devices.

If you would like more information on making a donation to the CRES Fund, please phone or write to Amy Parrott at (619) 685-3213, P.O. Box 120551, San Diego, CA 92112.

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CRES REPORT

CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

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CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

Calling All Cool Cats!

COME FOR A ROARING GOOD TIME!

Come for Cool Cats ✶ Hot Nights at the 19th Annual Celebration for the Critters and help save the world's endangered wildlife!

SATURDAY, SEPTEMBER 25, 1999
7 P.M. TO MIDNIGHT AT THE SAN DIEGO ZOO

- Prowl the party grounds of the San Diego Zoo
- Leap and swing to the sizzling rock-and-roll sounds of Art Deco & the New Era, Bravo Trio, Sariri, and more great sounds
- Savor tantalizing taste treats from many of San Diego's finest restaurants and beverage vendors
- Purr over the sensational Silent Auction
- Take a chance at drawings for fabulous prizes, including Delta Air Lines Business Elite class tickets and a Tiger River spa from Hot Spring® Spas
- Play zany games, ride the Skyfari under the stars, and meet some animal friends!

Proceeds from this "cool" affair at the Zoo benefit CRES, the Zoological Society's Center for Reproduction of Endangered Species, and its worldwide conservation efforts.

$50 PER PERSON (OR $60 AFTER SEPTEMBER 10)

Tickets to this event are also an endangered species, so order today! Tickets will be mailed for those reservations received by September 10. All others to be held at the door. Free parking.

FOR VIP PACKAGES AND TO CHARGE YOUR TICKETS, CALL (619) 231-1515, EXT. 4236.

Zoological Society membership is not required. Ticket sales will be limited. You must be 21 or older to attend.

CRES REPORT
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

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SAN DIEGO ZOO
SAN DIEGO WILD ANIMAL PARK

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